SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

COLLIERIES IN THE ST. HELEN'S DISTRICT.

The Haydock, Ashton, Edge Green, and Parr Collieries, carried by Messrs. Richard Evans and Sons, are the most extensive in his district, and amongst the most extensive in Lancashire. The gregate coal raised per day from fourteen different pits is upwards 3000 tons. The Haydock Collieries comprise the Legh pit mines, here the Six-feet and Nine-feet coals are worked, the pit is an upcast. e Queen Pit, a downcast, where the Six-feet and Nine-feet mines worked; another pit is now being sunk lower, as an air pit, for more effectual ventilation of both these pits. No. 1 pit—Hayck—is an upcast, and coal is got from the Florida mines. No. 2 t is a downcast for the same and the pump-shaft. The New Boston ts, downcast and upcast, coal is raised in both pits from the Four-feet nd Six-feet mines. The Old Boston pits, downcast and upcast, coal raised at the downcast from the two Florida mines. The Wood pits, owncast and upcast, coal is raised in the downcast from the lower Flo-da, 4 ft. and 6 ft. mines. The Florida pits, downcast and upcast, al is raised at the downcast from the Florida mines. There are four mping-engines in operation at Haydock, and one at Edge Green. The Edge Green Colliery comprises two downcasts and one up-t, coal is raised at one of the downcasts from the Four-feet mine. winding-engine has a pair of 24-inch horizontal cylinders, rais-from the depth of 200 yards. It may be stated that the depth Haydock and Edge Green pits varies from 120 to 200 yards. Of winding-engines in connection with these, one has two vertical linders, one has single vertical cylinder, the remainder are single d double horizontal engines. At the Queen pit, New Boston, ood pit, and Edge Green, there are engines—placed on the sur-e—for hauling from downbrows underground. The cages in all downcasts are provided with Owen's safety-catches, where wood nductors are fixed. In the upcasts, where wire-rope guides are d, they are not provided. In the deep pits the ropes are made ift from a strong spring, fixed over the cage. The ventilation of mines in every case is caused by furnaces; this remark will apply Lancashire generally; there is not a case, as far as I am aware, re ventilation is created by machinery.

The Ashton or Pewfall Collieries comprise Nos. 1, 2, 3, and 4 pits. 1 and No. 2 pits are downcasts, coal is raised at both from the r-feet, the Nine-feet, or Big Delf, and the Six-feet or St. Sebas-n Delf. The depth of these pits is 120 yards, and about 700 tons oal is raised at them daily, by a beam-engine from one, and a ble horizontal engine from the other. A beam-engine is erected pumping water from the depth of 120 yards. There are two or e upcasts in connection with these mines at various points.

o. 3, Ashton Pit, is one of the principal plants, having the most plete arrangements for raising and screening coal. A fire, un-unately, occurred in November, 1868, which destroyed all the d framing and head gear at the top of this pit; the present erec-s were put up with a view to avoid such a casualty; the flooring wo decks is constructed of iron, on cast-iron columns; the head alone is of wood. The winding-engine (from the works of R. lish, St. Helen's) has two 36-inch horizontal cylinders, 6-feet ke, direct acting, spiral drum, double seat valves, eight plain rs, under cover, 50 lbs. steam pressure. The spiral drum is . in diameter at the sides, which is first flat for three laps of the , the spiral then commences and takes seventeen laps of the rope o the outer circumference, where the drum is 32 ft. diam. on each . The space between the two spirals, about 1 ft., serves as the circle the steam break. The rope on one side winds once on the flat, and welve grooves, it draws from the Rushy Park seam, 336 yards in h. The other rope winds in fourteen grooves, commencing at the l spiral, and ending at the top; this draws from the Little Delf, yards in depth. Each cage carries eight 6-cwt. tubs, on four s. The ropes are 1⅛ inch in diameter, of steel wire. There are platforms or landings at the top of the pit, and two at the bot-whereby the tubs in two of the decks in each cage are changed ltaneously. About 500 tons are raised per day. There are four ns—that is, two to each landing. The small coal, separated the large in screening, is raised by two elevators to be re-ned, producing nuts and dust. Two drums are connected to the ling-engine, one on each side, on the second motion, by which, wire-ropes, the elevators are raised each time the engine raises ad from the upper or Rushy Park seam.

e Little Delf is identified with the Arley mine of Wigan.

The section of the seam is—

Good roof.	Ft.	in.	
—Good coal.....	2	10	
—Bass	1	0	
—Hard fire-clay ..	—		Used for packing.

The dip of the measures is south-east 6 in. per yard.

n levels are driven to the extremity in the north-east direction yards, to a large fault; six levels have been driven out, the three r are the intake levels, the three upper, about 20 yards above, are eturn levels. Two of the intake levels are driven 3 yards wide, ards of pillar between them, the upper one being the horse-road; ards below the middle level again is the level for holding the re-taken from the horse-road; this is 8 yards wide. The three upper ls are of similar dimensions. The levels to the south-west of the are driven 230 yards, and stand against a fault, downthrow ards to the south, which is not yet put through. A range of 300 ds between the levels, and a barrier of 50 yards left adjoining old kings, lays to be worked; this has been partly got by jig-brows and ls in ranks; the latter are 3 yards wide, and 11 yards apart from r centres; the walls between these being worked homewards rds in width, and from 200 to 300 yards back to the jigs. A new m of working this coal is being tried, and so far has been suc-ul. A pair of jig-brows adjoining are driven to the rise or h-west, 12 yards wide each, a road is formed in the middle of which is supported by pack-walls, built with the hard under-

On the south-west side of these the wide work is commenced; nce has been got as far as 40 yards wide; the roads are 15 yards , supported by pack-walls, without timber. The roads are de-d to go 70 yards, when another pair of jig-brows will be driven rk south-west another 70 yards. A hauling-engine is placed s seam, near the upcast, or No. 4 pit; it has two 15-inch hori-l cylinders, but has not yet been put into operation. A large f unworked coal lies to the dip, to be got by this engine.

In the Rushy Park seam the main levels are driven out in a similar manner to those described above.

Section of seam—Metal roof	—		Used for packing.
—Top coal	0 ft.	8 in.	Sometimes left for roof.
—Clod	0	6	
—Bottom coal.....	2	10	
—Underclay.			

This seam is also now being got by wide work, the greatest length of face as yet being 32 yards; the roads are 15 yards apart from their centres, the coal from each is sent down the jigs by balance wagons, which are well suited for the purpose. The face or cleat of the coal runs about north-west, parallel to the jig brows, so that the walls are worked best on the level direction—that is, south-west. There are faces in the coal at right angles to the principal ones; these are termed cracks, and are only perceptible when pressure acts upon the coal. In working to the rise, against the cracks, or on the end, the coal is more difficult to drive, and yardage is paid in that direction, but generally more large coal is produced than in driving on the level course. The packing for the gate-roads is obtained from the roof falling in the spaces between the gate-roads; the packing is made 6 ft. in width, this supports the roads in itself effectually, no timber is required, though these roads have been extended now about 70 yards. There are two engine brows in the Rushy Park Mine, about 500 yards in length each, one set of drifts (three places) going to the full dip or south-east, the other set going cross-cut, or nearly east. At 300 yards down the brow levels are being extended on each side. The engine for hauling up the two brows is placed at the top of the upcast, No. 4 pit, having two 15-in. horizontal cylinders, one 8½-ft. drum—15 tubs are drawn at once. There is another engine at the top of No. 4 pit for hauling from the Nine-ft. mine in connection with No. 1 pit; this engine has an 18-in. horizontal cylinder, 4-ft. stroke, and one 6-ft. drum. No. 4 upcast pit is 13 ft. in diameter. There are two furnaces in the Little Delf seam, each 4 ft. wide by 6 ft.; these are supplied with fresh air. There are two similar furnaces in the Rushy Park seam, the return air passes over these. The quantity of air in circulation in the Little Delf Mine, in four splits, is 85,000 cubic feet per minute. The circulation in the Rushy Park, in six splits, is 75,000 cubic feet, making, with the fresh air supplied to the furnace, about 165,000 cubic feet passing in the upcast. Safety-lamps are used in both these mines; these are regularly locked by lead rivets every time a lamp is lighted, which effectually prevents a lamp being opened by anyone without detection. This contrivance is in use also at some of the Haydock mines. Powder is used for blasting the Little Delf coal; it is not used for the Rushy Park coal at all, and we hope it will be dispensed with in all fiery mines. In the Little Delf Mine there are five horses; in the Rushy Park Mine nine horses are employed hauling on the levels. The gauge of the road is 30 in., bridge rails of 18 lbs. per yard are used generally in the workings, levels, and engine planes. The new system of working in the two mines we have described has been attended with satisfactory results, and will, no doubt, supersede the indirect method of getting coal by strait work on the rank system, so much in practice still in Lancashire. Messrs. Evans are applying the wide work system in most of their mines; both safety and economy we are assured will result from it.

Parr Colliery.—There are three pits here recently sunk, in close proximity, one 13-feet pit, downcast, 215 yards in depth to the lower Florida seam—the upper Florida is found 6 yards above; one 13-feet pit, downcast, 340 yards in depth to the Ravenhead, or 9-feet Delf; one 16-feet upcast pit, 230 yards in depth to the lower Florida seam. A quicksand was encountered in sinking the two downcast pits; in consequence about 28 yards of tubbing is inserted at the top of each pit, which excludes the water; below the tubbing a lining of bricks and mortar is inserted to the bottom of each. The quicksand was not found in the upcast pit, and no tubbing is there inserted. The winding-engine at the Florida pit has one 30-in. horizontal cylinder, 6-feet stroke, direct acting. The drum for two round ropes is 15 feet in diameter at the middle, and 16 ft. at the sides. This engine raises four 8-cwt. tubs in each cage, in two decks; there are two stages or landings at the top and at the bottom of the pit, so that the whole of the tubs in both cages are changed simultaneously. Owen's safety catches are applied to these cages. The Parr pits are situated about the middle of the estate; the levels in the Florida Mines are being driven out to the boundaries; three levels are driven, each 4 yards wide. The extreme distance to the boundaries will be about 800 yards each way, also 800 yards to the rise and to the dip. The dip of the measures is 1 in 4½ to the south-east. The upper Florida coal is 3 ft. 10 in. in thickness; the lower Florida is 5 ft. 4 in. The upper Florida is got by a tunnel driven from the lower. Coal is drawn from a downbrow at present by an engine, with two 8-in. horizontal cylinders. The most notable feature at Parr are the pumping appliances, from the works of Messrs. Routledge and Ommanney, erected in 1867, which are much approved of. Owing to the existence of old workings in the higher seams, the principal influx of water is from above the 20-in. seam. This seam, which, however, measures here 3 ft. in thickness, is found at the depth of 147 yards.

The principal pumping-engine is placed in this seam, and forces water up a main pipe in the upcast pit, 15 inches in diameter. There are two 36-in. steam cylinders, two 13-in. plungers, 2 ft. stroke, all horizontal. Both rams are double-acting, so that a double stroke of each ram is equal to 8 ft. of vertical column. The engine goes ordinarily 22 strokes per minute, but can be driven to 30; it is worked about eight hours per day. The steam is brought down the pit in pipes from the boilers at the surface; 45 lbs. is the working pressure. The exhaust steam is condensed in a tubular condenser; a pump, worked by the engine, throws the water from this condenser into the lodge room. About 10 lbs. of vacuum is thus obtained. In the Florida seam a similar engine is erected, which pumps from the lower Florida up to the large engine in the 20-in. seam, a height of 83 yards. This engine has two 12-in. steam cylinders; two 6-in. plungers, 15 in. stroke; the tail and main pipes are 9 inches in diameter. This engine was erected in 1868. The exhaust steam blows into the lodge room. The steam pipes in the pit are 7 in. to the top engine, and 4 in. below. In the same chamber a smaller engine is placed, with one 10-in. steam cylinder, 9-in. stroke, 3-in. plunger, working horizontally; it forces water the whole height of the pit, 230 yards, in 3-in. mains, to supply the boilers.

There are two temporary ventilating furnaces in the Florida seam. The air in circulation in both mines is about 70,000 cubic feet per minute. The winding-engine at the Ravenhead pit at present has a pair of 15-in. horizontal cylinders, on second motion; an engine will be substituted having four diagonal cylinders. An engine on this principle, with two diagonal cylinders fixed on cast-iron framing, is placed at the top of the upcast for winding. A capstan in one house is worked by a 6-in. horizontal cylinder, on the fourth motion.

Messrs. Evans have extensive machine and other shops, and foundries at Haydock, which give employment to about 300 persons. Fourteen locomotives are used for the conveyance of coal and other materials between the Collieries and Earlstown Junction, and also to St. Helen's. These locomotives and other stationary engines were built at the Haydock works. Castings, boilers, and machinery are extensively made, and to a great extent sold.

MINING NOTES FROM NORTH WALES.

The marked progress which has been made in the development of the minerals of North Wales during the past year appears likely to be maintained, if not exceeded, by the opening out of entirely new concerns, and the clearing of mines long since abandoned and now water-logged, but which at one time paid very good dividends. Up to a comparatively recent period investing in the Welsh lead mines was looked upon as a somewhat hazardous speculation, so few of them were paying, owing to the many small ones which were started with very limited capital, and soon came to grief, or were just able, by means of great economy and limiting the number of persons employed, to meet expenses. It has, however, been clearly demonstrated, more particularly of late, that where there has been sufficient capital to provide efficient machinery and appliances for the working of mines, the results in most cases have been satisfactory. Several companies are now improving their machinery, and some of those which have not yet been able to pay a dividend are in a transition state, and give promise of ultimately being successful, and repaying the investors not only for their capital, but for their patience as well. It is true that all mines will not turn out so valuable as the well-known Van has so far done, and persons speculating should not be too sanguine, as the allurements which are now held out are very captivating. Formerly the mines of North Wales were simply known as lead mines; now, however, they have the important and significant prefix of "silver-lead," although the last returns for the whole of North Wales show that there is very little more than 6 ozs. of silver to the ton of ore, whilst the Laxey Lead Mine (simply), in the Isle of Man, yields 48 ozs. to the ton of ore.

There is now every appearance that some of the old mines in the neighbourhood of Mold, but which have long since been abandoned, will very shortly be opened out. Two gentlemen, of considerable practical experience, have applied for leases of the Rhyd-y-Mwyn, the Pen-y-Flon, and the Pant-y-Mwyn, which were formerly very profitably worked, and, no doubt, will well repay those who invest in them. The parties applying for leases are of opinion that no difficulty whatever will be experienced in raising the necessary capital, which will, it is said, be 50,000*l.*, as the workings are very extensive, and powerful machinery will be required. The lessors of the greater part of the minerals in the neighbourhood of Mold is the body known as "The Lords of Mold," and include Lord Mostyn, Lord D'Acre, Mr. C. B. Roper, Trevor Perkinson, Major Williams, of Anglesea, and Mr. Howard, of Loughton. A report on the state of the mines of which the lords are lessors, and of the minerals belonging to them, is now being prepared, and will shortly be presented; and a meeting of them is to be held during the present month, when it is expected that the leases of the mines alluded to will be granted to the successful applicants.

The Old Cathole, or Mold, Mines are looking very favourably, and are sinking at the engine-shaft, having got about 20 yards below the old workings; by going 10 yards lower they expect to intersect the lode. They are driving east in the 90 fm. level, and have cut through a bar of ground of a very promising character, and composed of ore, spar, and calamine. In cutting a strong feeder of water has been tapped, and which, of course, is a very good indicator as to the ore. The Glan Alun Mine is now looking very promising, and they are now cutting some very nice ore.

Talargoch is in a healthy condition now, and some fine ore is being got in the east and west ends, as well as a good deal of black jack, which is worth nearly 4*l.* per ton. The mine is probably the oldest in the Principality, and, although worked for many hundreds of years, and raised more lead than any other, it is in a highly prosperous state, and likely to be so for a long time to come. There are some powerful pumping and other engines—one of them a 100-in. cylinder—being worked at the mine, which is about four miles from Rhyl.

The Gladstone Mine, near Holywell, which is in the hands of a few local men, is now raising about 15 tons of ore per month, and is looking well.

At Holywell Level some nice ore continues to be raised, and the mine gives every promise of maintaining its position as one of the most important in the locality.

Business is progressing satisfactorily at the Maes-y-Safn Mine, which is now one of the finest in the Mold district.

The prospectus of the Hazelgrove Mine, in the Halkin Mountains, about two miles from Holywell, has just been issued, and is spoken well of by some practical men, although it lies to the west of the district where the mining operations are being conducted.

At the extensive smelting-works of Messrs. Walker, Parker, and Co. (the largest smelting firm in the kingdom) considerable alterations are being made at Bagilt. They are now constructing a flue, 2¼ miles in length, owing to the operations at the Buttersfield Colliery having interfered with the supply of water required for the condensing apparatus. The flue, we believe, will be similar to the one at the works of Mr. Beaumont, M.P., Northumberland, whose lead mines are the largest known. There is also to be a tower, 80 yards high, so that the works at Bagilt will be a source of attraction to persons interested in the lead trade, as well as others.

THE USE OF GUNPOWDER IN COLLIERIES.

Sir,—In the discussions and correspondence reported in the Journal in reference to the use of gunpowder in mines, and its attendant danger, there is one point of importance that I do not remember having seen touched upon by anyone, but which appears to me to be of considerable value, and that is a proposal to have in each colliery a "powderman" or "powdermen," where it is necessary or expedient to use powder.

It is generally considered essential, in dangerous mines, that the *fireman* should examine the place, and ascertain whether it is safe, before the shot is fired, and then should himself light the fuse. But this only half meets the case—if it does quite half meet it—for, if the hole is badly placed, or has too much powder in it, or too little, for the work required to be done—or if it is badly stemmed, or is too shallow, all and each of these are beyond the ken of the fireman, and they are just those causes from which gunpowder accidents most generally arise, and are the consequence of the inexperienced, or unskilled workmen, who have done all but placed the light to the fuse.

There are a great number of men working in the collieries and mines of this country who, although they are ordinarily good workmen, are yet quite unskilled in the use of gunpowder, and have no idea of the matter of estimating the quantity of powder that should be put into a hole to do a certain amount of work in any particular ground or vein of mineral; it may require more, or it may in a particular place require less, and, while powder is permitted to be used in the coal, it does not seem to be practicable to institute an examination of the men, to ascertain who amongst them are capable of using powder with safety, and who not, for none of them would be likely to acquiesce in a decision that *they* were incapable, and they would necessarily resent any prohibition affecting *them* that was not applied generally.

I think the case might be met, and the greater part of the danger removed, by the employment of powdermen, whose sole duties should be to go round to charge, stem, and fire the holes, and in whose sole charge the whole of the powder in the collieries should be placed—the workmen themselves boring the holes, but on no account being permitted to have powder, or fire a hole themselves, without express permission from the manager. If the powderman went round twice in the course of the turn, he would probably be able to charge and fire all the holes in the district assigned to him—and the men would soon be able to so regulate their work that they would have their holes ready when he came round to them. Amongst the advantages that would attend such a system of firing may be placed the advantage of having a man throughly skilled in the use of powder, with whom a blow-out charge or an excessive charge, that would send a sheet of flame out into the workings, would become impossible; but he would be able to so estimate the quantity of powder to the requirements of each place that very little, if any, danger would be incurred by its use: he should also be able to refuse to fire or charge any hole that was so placed by the workmen that a blow-out seemed inevitable; or, also, being so placed that it would seem to be a waste of powder to fire it at all, from the position offering scarcely any resistance; the workmen would thus soon be greatly improved in their manner of *placing* the holes for safe firing—another advantage. The use of powder by unskilled hands would thus be wholly avoided, while under careful management it would still be permissible, and the powderman would have the powder in such positions that there would practically be no danger to the colliery by its presence, and it would be scarcely possible to attribute accidents to powder which did not properly pertain to its use.

These powdermen would also, presumably, be good, intelligent men, to whom the ventilation of the workings would be thoroughly well known; and, as they would be passing round through a certain district daily, or twice a-day, and necessarily be examining the air and workings to ascertain that it was safe to fire the shots, there would be an enforced supervision of the working places that would, presumably, greatly contribute to lessen accidents and ensure safety. If invested with the power, the powderman might also require the men to stand timber in the dangerous places, and compel them to cease from their other work until that was done, for these things are often deferred until some other thing is finished, and before it is quite finished down comes the stone or other material, and the man is frequently killed—the penalty of his fancying he could not *then* spare the time to make his place safe, or of trusting to "luck" that there would be no danger for a short time longer, until his fancied convenience would admit of his placing his life out of imminent danger. Such cases are by no means imaginary. Of course, care should be taken not to place so much on the powderman's shoulders that he would be practically unable to do any part of it efficiently.

As to the payment of the powdermen and the expenses of powder, &c., it would, of course, be properly chargeable to the men, and the cost of both should be equitably divided over those who would be thus benefited by such an arrangement. It seems but reasonable to anticipate a considerable diminution of casualties from the use of powder, and probably other causes also, such as falls, by this proposition being applied; and, if so, it would appear to be advisable to have some such provision inserted in the New Mines Regulation Bill, in order that its adoption may be the better ensured.

Pontypridd, June 14. WM. LINTERN.

GOLD MINING IN CALIFORNIA.

SIR,—My attention has been drawn to the many companies formed in England for working mines in California and the other States of America. Having spent a number of years in practical mining in Australia and California, I am induced to make a few remarks from practical observation. The purchase of mines in the latter State should be done with extreme caution, as everyone who has been in America well knows that the Americans can value and work a good mine themselves.

I am surprised, after so many years of experience in gold mines, how the public can still be led astray by a sample from a lode, as it is no criterion whatever as to its value; and yet we see the statements put forth of the yield of samples taken. Have the speculating public lost sight of the wonderful samples taken from the Lucy Phillips, and the extraordinary yield of the Chontales by fire assay? I need not refer to the yield of the latter mine for the last two or three years. I have seen many a lode give good results by fire assay, but the only true and proper method to test an auriferous quartz lode is to break at least 500 tons from different sections of the lode, and possibly it would not pay for crushing. Such cases have come under my observation. Again, lodes containing sulphurets of iron, copper, and blende—take a sample of such a lode, and the result will be enormous, and the returns may be good by the ordinary process of reduction and amalgamation. At the same time, I approve of a quartz lode being well charged with sulphurets.

I am well aware that there are many good mines in California and the adjoining States; but, as remarked above, I generally found the Americans had sense enough to keep good things in their own hands. The high percentage on money is also put forth as an excuse for selling the gold mines in London, on the ground that cash cannot be found for working or opening mines. The idea is most ridiculous. I ask any owner of a good mine whether cash cannot be had in San Francisco for opening or erecting machinery if required? if not, times must be greatly altered, as I well remember when there was no difficulty whatever in obtaining cash or selling good mines at reasonable rates. I need not remind those intending to speculate in American gold mines that the reason so many mines are offered for sale in London is that the prices obtained are fabulous, and while such prices continue to be paid any amount of imaginary rich mines will be found by the string of colonels, captains, and judges that California can produce. I am still at a loss to understand how it is that the public do not, or will not, see the difference of a gold mine being worked by a set of practical miners, all having an interest in the mine, and companies being formed, with an army of incapable officers; very often in the former case each shareholder looks after the main thing—in the latter, should the ledge be what miners call a specimen ledge, a large quantity of the gold finds its way into other pockets besides those who may have paid several pounds for each share. To be more explicit, the fact is well known that eight out of ten of the gold mines which pay when they are worked by private individuals or miners would not pay when they are worked by companies. The reasons are simply these—first, a large sum is paid for the mines by the company; then capital must be raised for carrying on the mines; also, a large and too often useless, because inexperienced, staff is sent out from England, at high salaries and great expense. Then commences the introduction of patent machinery; and the last act is the company finds it necessary to suspend the mine, as it does not pay. Possibly many mines that have come to grief in this way if worked carefully by a set of miners would pay well.

I notice a correspondent in a late issue of the Journal speaking of the Cornish stamps. From reading his remarks I am led to believe that he is not well acquainted with the Cornish stamps, or with the splendid clean and neat set of stamps that can be seen in California; and I am sure that any practical man will concur with me in saying that the Cornish stamps is not to be compared with the Californian stamps for the work it has to perform. By no means do I wish to depreciate the Cornish stamps, as it is well adapted for the use it is applied to in Cornwall, in reducing tinstone. In countries where there are no foundries we often find the Cornish stamps, but in California machinery equal to any part of the world can be produced, particularly for gold mining.

In conclusion, I would say to all intending investors in gold mines—avoid all patent machinery and the yield or value of an auriferous quartz lode by fire assay. W. HOSKIN.

Sulphur Mines, Norrtelje, Sweden.

THE NOVA SCOTIA GOLD MINES.

SIR,—The following are the Official Returns for April, 1870:—

District.	Mine.	Tons.	Ozs.
Montagu	Symond's	19	49
"	"	—	47*
"	Lawson	22	86
	Hyde's	91	56
Mosquodoboit, now declared the "Caribon District"	Leopold	No returns.	
	Tonquoy	31	132†
	"	16	50
Oldham	Sterling Company	No crushing.‡	
"	Several	76	97
Renfrew	Several	82	67
Stormont	Allen		
"	Mason	No crushing.	
"	Gisborne		
"	Stormont Company		
Sherbrooke	Palmerston	193	69
"	Wellington	207	200
"	Dominion	270	156
"	Sherbrooke Gold M. Co.	No return.	
"	West	18	75
"	Chicago	80	25
"	Other small mines	215	189
Tangier	Strawberry Hill Co.	46	74
"	Humber Gold Mining Co.	74	33
"	Burlington Gold M. Co.	74	34
Uniacke	Uniacke Company	70	19
"	Queen's	125	40
Wine Harbour	El Dorado	137	62
Waverley	Bürkner	95	20
"	North American Gold Mining Co., American Hill Company	131	49
Total		2072	1629

Mines Office, Halifax, June 2. JOHN KELLY, Deputy Commissioner.

* From old plates. † Omitted in February. ‡ New mill not yet running.

THE METALS AND THEIR ORES—No. V.

SOLAR SPECTRUM, AND SPECTRUM ANALYSIS.

SIR,—It was the illustrious Newton who first discovered that light was a compound, consisting of seven different colours. He admitted a ray or beam of sun light into a darkened room, through an aperture in the window shutter, and by allowing the beam to pass through a triangular-shaped piece of glass, called a prism, the light was refracted, or bent from a straight course, and decomposed into seven differently coloured rays, which were received on a screen—red, yellow, orange, green, blue, indigo, and violet, the most refrangible being violet and the least so red. The oblong image of coloured rays thus produced is called the solar spectrum, and is identical with the formation of the prismatic colours of the rainbow. But not only is the light of the sun of a compound nature, but that also of the planets and fixed stars, and of the electric spark and ordinary flame, and the light from each of these sources may likewise be decomposed into its primary colours. If the solar spectrum thus produced is minutely examined by a species of telescope, called a spectroscope, the observer will see numbers of dark lines running parallel with the edges of the prism, and apparently scattered without regularity throughout the spectrum. These lines were first noticed by Dr. Wollaston, but they have been more elaborately investigated by Fraunhofer, and after him called "Fraunhofer's lines." The spectrum from the planets, illuminated by the sun, gives the same dark lines, but, of course, paler; whilst the lines in spectra produced by the fixed stars, which shine by their own light, although present, are placed in a different position to those in the solar spectrum.

If the spectrum from a ray of artificial light, which contains no metal or volatile substance, be examined by the spectroscope no such dark lines will be seen, and there will be no gap, or division, between one colour and another; but if a metal is present in the light or flame examined, however minute, the quantity of such metal, bright lines or bands separated from each other by spaces of darkness, and characteristic of the various metals, will be recognised in the spectrum, and by noticing in which portion of the spectrum the bright bands are visible, and by observing the number, colour, and position of such lines, the metallic substances by which they are caused can easily be discriminated and detected, and with the most absolute certainty, as every metal gives its own system of bands; and the lines, unaltered in position, are always produced peculiar to the substance causing them, and to none other. Thus the spectrum of sodium contains one bright yellow line, potassium a violet and a red line, thallium a splendid green band, irridium an indigo blue line, lithium a yellow and red band; calcium gives violet, green, and yellow lines; strontium, blue, orange, and six red lines; barium communicates a number of green lines; calcium imparts distinct and equally characteristic bright lines; and so on with each different metal. Therefore, after becoming acquainted with such bands it only requires a mere inspection of the spectrum of any metal to be at once able to declare which is present. By observing lines that did not belong to any hitherto known metallic substance the discovery of the four new metals—calsium, rhubidium, thallium, and irridium—was inferred, and afterwards corroborated, the two latter metals existing in iron pyrites and nearly all zinc ores.

In order to apply the principle of spectrum analysis to an analytical investigation, it is usual to ignite and volatilise the metal or ore to be examined, by means of an intensely hot but non-luminous flame, or by means of the electric light or spark. The light from the resulting luminous and incandescent vapour of the metal is then conducted through a glass prism, by which it is refracted and decomposed in the manner previously described, and the image or spectrum containing the characteristic bright lines can then be examined by the spectroscope, when the distinguishing features of the bands will be observed, and the metal or metals clearly identified and noted.

Having now briefly described the principle upon which the metals existing on our earth can be detected and distinguished by means of spectrum analysis, I shall have to reserve until next week an explanation of the manner in which the composition of the heavenly bodies can likewise be equally as acurately determined.

Mining Offices, Shrewsbury, June 13. EDWARD GLEDHILL.

THE TANKERVILLE MINE.

SIR,—I understand a desire has been expressed by a number of shareholders in this company that the next meeting, intended about July, should be held on the mine, at Minsterley, and, for this purpose, I beg to ask the favour of your bringing this matter before the shareholders, through the medium of the *Mining Journal*.

Having been recently passing through Shropshire, I availed myself of the opportunity to pay an unexpected visit to the mine, and was certainly most highly pleased—indeed, startled—with the extent of the rich formations and splendid yield brought out during the time of my inspection; and it occurs to me that the offer of a similar opportunity, especially during the continuance of this remarkably fine weather, would be a most welcome boon to my fellow-shareholders, many of whom may be practical geologists, and, therefore, competent to form some idea of the vast resources within the control of this company. The predictions of Capt. Waters, although exceedingly glowing, have, I am happy to say, been more than verified, and the prospects now opening up are certainly more than ever encouraging as to its profitable yield.

I trust in asking your advocacy in the matter of the meeting that it may be not deemed too great an intrusion on your space. A SUBSCRIBER.

Wolverhampton, June 14.

MINING IN CARNARVONSHIRE—SYMDDE DYLLUAN.

SIR,—I see one of your correspondents, in last week's Journal, seems rather sceptical about the existence of a mine by the above name, although he seems to know much about its next neighbour, the Pen'Allt Mine, the two being adjoining, in a north and south direction. Being conversant with the locality, and for over six years had much to do with the working of the Symdde Dylluan Mine, perhaps you will allow me to inform that gentleman that the mine is situated at the head of the Nantile Vale, in Carnarvonshire, and has been worked over a century for copper ore, principally by private individuals, and, like its neighbour, the old Drws-y-Coed, has been famous for its rich quality ores, consequently neither has been offered to the mining capitalist; their ores being sold by private contract, they have never even appeared in a ticketing list, hence the very little that is known of their existence, or the enormous quantity of ore which has been sold from them.

Notwithstanding the Symdde Dylluan Mine has had its difficulties—for several years there was endless grievances between the lord and lessee—yet the mine never ceased selling ore, nor was it ever abandoned through the poverty of the lodes. In the year 1858 there seemed to be a final settlement of all difficulties, and a lease was obtained by a gentleman of standing, who sub-let the mine to a private company, on terms greatly to his advantage. The present machinery being at once fixed, the mine was re-opened; the engine-shaft was sunk 14 fms. below the old workings, and from March 8, 1860, to March 16, 1864, 1814 tons of ore was sold, realising 10,827*l.* 16s. 1d. net, the sale for 1863 being 694 tons, realising 3703*l.* 14s. About September, 1863, a difference arose between the sub-lessee and the company about the reduction of the royalty, it being then 1-10th, which ended in the former purchasing the whole of the plant as it stood, and taking the mine into his own possession. When operations began what was called a more practical mode of working was adopted; the result was it soon came into other hands, and the new plan of working has been continued up till now. This new plan was to abandon all working on the lode, and sink a new shaft. The principal runs of ore ground from which returns can only be made have been left underwater, and therefore the sales of ore have been exceedingly limited. Notwithstanding, the mine is really a good one, and with practical management would soon become profitable and lasting—a success the present proprietor richly deserves.—*June* 15. THOMAS JULIAN.

ROCK-BORING BY MACHINERY.

SIR,—I have observed several letters from Mr. H. Sewell in the Journal on different topics, the first being on Shaft Sinking by Aid of Boring Machines, with a promise to give your readers full particulars of its daily progress at an early date. Although that letter appeared so far back as October last, I have not yet seen any publication of its result: perhaps he is now fully prepared to inform them of its success, the subject being of vital importance to the mining community. The several months' experience that gentleman has, no doubt, had of the working of the machine, and the progress made in the sinking of the shaft, with general remarks on its efficiency will probably be greatly interesting.

The second was on the subject of the Low Wages of Welsh Mine Agents—styling himself Consulting Engineer of Mines, of course, he would have control over the under-agents. Perhaps he will also explain to us why he set the first example in the Principality, by reducing to the lowest degree the wages of his own agent, and then in so short a time advocating publicly a general rise?

June 15. THOMAS JULIAN.

[For remainder of Original Correspondence, see this day's Journal.]

MINERAL RESOURCES OF THE ARGENTINE REPUBLIC.

English capital has already been invested for aiding the development of the mineral resources of the Argentine Republic, but probably few who contributed their funds had any conception of the enormous extent of the mineral deposits in the country with which they were connecting themselves. Major F. I. Rickard, whose position as Government Inspector-General of the Mines of the Republic has given him peculiar facilities for acquiring accurate information, has now written a complete history of the resources of the country,* and the obvious result will be to direct more general attention to the advantages which the country offers as a field for investment of capital. The acquisition of mining property in that country, says Mr. Rickard, is one of the most inexpensive procedures possible to desire. The discoverer is entitled to all mineral veins he may find in the mountains, without regard to the owner of the soil, who exercises no right to the mineral deposits contained beneath the surface, save and except when he is the discoverer. This law, however, does not apply to coal, salt, sulphur, or quarries—all of which belong exclusively to the owner of the soil. But in the case of mineral veins the discoverer or his representative, by purchase or otherwise, must comply with certain rules and restrictions, in order to secure his or their title—he must work the claim (which consists of from 200 yards long, by 100 wide, to 200 yards square, according to the underlie) constantly, or at least without allowing ninety consecutive days to elapse at any period, and with at least four miners; otherwise, he exposes the property to be denounced by another (any one—the first who knows of its forfeiture), who will be entitled to it on the same terms as his predecessor, and must comply with similar obligations.

The chief drawback to the development of the mineral resources of the Republic appears to be the want of better accommodation for the transport of ore and materials, and upon this subject Mr. Rickard's observations are particularly encouraging. Blessed with, perhaps, the finest climate in the world—where from the extent of territory, larger than Europe (excepting Russia) any temperature may be selected to live in—the Argentine Republic is destined to become, at no distant day, the great rival of the United States as a field for immigration, and once populated, in even a less degree than that country, its great internal wealth and resources, agricultural as well as mineral, must make it stride far ahead of it, and become at once the great Republic of the South. In no country in the world is the construction of railways so facile and inexpensive. The great pampas, or level plains, stretching away for a thousand miles east and west, present no obstacle to the laying down of permanent way almost without earthworks. Already the locomotive is penetrating slowly but surely into the vast pampa, and every mile of rails laid down is equivalent to a large instalment of capital to develope the great resources of the nation. The eastern extension of the Central Argentine Railway, now being carried out in the direction of San Luis, Mendoza, and San Juan, will open up a vast field in mineral and other wealth. The rich silver-lead mines of San Juan and Mendoza will then become objects of earnest competition. The rich gold fields of Guailian, in the province of San Juan, now being worked by the Anglo-Argentine Company, with exclusively British capital and enterprise, are second to none yet discovered in South America. The San Luis gold fields are no less important in extent and quality, and Mr. Rickard hopes to see within the next year such an amount of capital and intelligence brought to bear upon them as will produce brilliant results and positive returns.

To facilitate the ready appreciation of the relative advantages as fields for the employment of capital, Mr. Rickard takes the several districts separately, and considers their geographical position, general physical aspect, climate, and resources, &c, in so many sub-divisions. From the sections devoted to the mineral resources an outline is extracted, to enable an opinion of the valuable contents of the book to be formed. In the province of San Luis the mining industry is at once in its infancy and old age. Some gold mines are so irregularly worked and destroyed that they not only leave no profit upon the actual working, but are positively dangerous to the lives of those who are obliged to labour in them. But there are many new veins of gold, silver, copper, and lead ores which are still either in superficial workings or abandoned from want of capital and perseverance on the part of their former owners. The Birorca Mine was re-opened in 1865 by a German, Mr. David Levingston, but he does not appear to have been very successful. The districts of La Carolina have been renowned for ages for their great auriferous wealth. La Canada Honda is about 20 leagues from the city of San Luis; here, at the height of about 4126 ft. above the sea-level, the first gold placer washings are to be found. The temperature is cold in winter, but agreeable and healthy in summer. Formerly the placer miners of Canada Honda were unable to work to any great depth from the invasion of water, which was quickest in the part most productive in gold, but Mr. Mauricio Morales overcame the difficulty by making a canal to a deeper level. The gold is extracted by long toms, with riffles. Working on a restricted scale from want of capital, Mr. Morales has extracted during six years 1600 ozs. of gold, at a cost of 2166*l.* From the placer washings of Canada Honda the road takes a westerly direction, passing through the chain of hills which divide La Carolina from the Canada at a height of 4903 ft. above the sea-level. The gold produce of La Carolina, including that of Canada Honda, is about 160 ozs. per month, the value of which may be calculated at about 500*l.* The roads in this province are simply mule-tracks. On the plains roads could be constructed cheaply; but amongst the mountains, and to reach La Carolina and Santa Barbara from San Luis or El Morro, it would require an expenditure of 500*l.* or 6000*l.* to make a fairly transitable carriage-road. From a commercial point of view, Mr. Rickard thinks the best route for such a road would be between San José del Morro and Canada Honda, with a branch from the Cerro del Rosario towards the north-east to reach Santa Barbara. It would thus place the mining districts in more immediate contact with the great centres of business, with the projected railway to Rio Cuarto, and finally with the capital of the Republic.

With regard to the province of Mendoza, mining is at present limited to a single district, that of Paramillo de Uspallata. Numerous lodes and mines exist in the southern part of the province, some of them of importance, but they are not being worked. The nearest of these is the Cerro de Cacheuta, at a distance of about 10 leagues S.S.W. of the city. There is a small lode, containing various metals—lead, silver, copper, iron, cobalt, silenium, &c., in varying proportions. In Paramillo de Uspallata great and general enthusiasm now exists for mining, resulting as much from the discoveries of mineral riches that have been made in depth as from the success which has attended the smelting operations in argentiferous copper regulus. The province of San Juan possesses a metalliferous zone of 40 leagues in length, and as many in breadth, the greater part of the region being traversed by mineral veins, and the extent and richness of its deposits being still unknown. The Tontal mineral district is one of great promise, which would if well worked yield profitable returns to investors. Coal deposits are referred to in both San Juan and Cordoba, and in the latter province the indications of a really useful fuel are all that could be desired (in San Juan it is a lignitic fuel that is used); Mr. Rickard is of opinion from appearances that at a depth of 300 ft. or 400 ft. beds of excellent coal will be discovered. The province of Cordoba is by nature fairly provided with carriage-roads, owing to its physical advantages and even character of its plains. A good carriage-road is, however, necessary from Soto to the mineral districts, and will, Mr. Rickard believes, be made by the local Government.

The details given by Mr. Rickard are ample to convince the most sceptical that the Argentine Republic offers an admirable field for mining enterprise, and that many other industries, if established there, would prove highly remunerative. The mines appear to have been worked in the most unsystematic manner, and only near the surface; but with capital and energy they can readily be brought into successful work. The work throughout is well adapted to carry out the object sought—that of making British capitalists acquainted with the many advantages which are offered them in return for their attention to the wants of the Argentine Republic, and Mr. Rickard has, doubtless, done equal service to them and to the country in which he now enjoys a prominent position as a Government officer, entrusted with the supervision of an important branch of the national industry.

* "The Mineral and Other Resources of the Argentine Republic (La Plata) in 1869." By Major F. IGNACIO RICKARD. Published by Special Authority of the National Government. London: Longmans, Green, and Co.

HOGG'S SECRET CODE.—Although as a rule the sending of a telegram secures ample secrecy, there are some cases in which the use of a secret code would be highly advantageous, if only to enable a principal in case of necessity to receive a business message in a form altogether unintelligible to his employees. The tables consist of 26 alphabets; in the first A is represented by A, in the second by B, and so on. Then a key-word is chosen, and this is written over the message to be sent, and the cypher for each letter is picked out from the alphabet belonging to the corresponding letter of the key-word. To decipher a message without the key-word would be almost an impossibility, though with the process it is simple. The arrangement of the code is very ingenious, and will prove ample for all practical purposes.

FOREIGN MINING AND METALLURGY.

The price of some qualities of coal is on the point of being raised in the coal basins of the Nord and the Pas-de-Calais, the condition of which is described as more prosperous than ever. This advance is only the natural consequence of the difficulties against which coal owners have to struggle, in order to keep pace with the orders with which they are described as "encumbered," or overdone. This remark does not, however, apply to industrial qualities of coal, of which there is a certain stock on hand; even as regards industrial coal, it may at the same time be stated that prices are very well sustained, and that coal owners are anticipating good orders. Negociations have continued with reference to the renewal of contracts for supplies required for Paris works; some of these negociations have been carried through, but in other cases the parties remain undecided. In Belgium the coal trade maintains a prosperity which is expected to continue. All descriptions of coal are in strong demand, and as regards some of them the extraction appears inadequate to meet current requirements. Contracts are being renewed tolerably freely, consumers being apparently of opinion that it will be impossible to obtain a reduction in prices, however small.

Some contracts for plant have been let on account of the Belgian State Railways. MM. Noulet and Co. obtained the order for some turn-tables of the type in use on the Northern of France Railway. The Belgian works producing rails continue actively employed, and in this respect the state of metallurgical affairs leaves nothing to be desired. Merchants' iron does not enjoy, however, an equally good position, being offered almost in vain at a slight decline; supplies appear to have been laid in, and the production must certainly feel the effects of this. It is expected that prices will not be long in reviving, and that it will not be necessary to make new concessions. Some of the great Belgian establishments are taking measures to extend their production. The Cockerill Company is about to apply itself to the production of Bessemer steel. The Jupille Rolling Mills Company is also about to increase its production. A royal decree authorises M. Goffin to add to his Clabecq Iron Works two new puddling-furnaces.

As regards current French metallurgical and mechanical topics, we may note that the Strasburg Gas Company is establishing a great gasometer in cast-iron segments. The Turkish Admiralty has instructed the Société des Forges et Chantiers de la Méditerranée to proceed with some gunboats, eight in all, the order for which was given some time since, although its execution has been postponed from economical considerations. The gunboats are now to be completed as rapidly as possible. Affairs have regained a considerable amount of animation during the last few days upon the French metallurgical markets. The provinces and Paris, which had slackened their orders for iron, have applied themselves vigorously of late to purchases, and quotations have, in consequence, been supported with much firmness. Rolled coke-made iron in bars has brought 8*l.* to 8*l.* 4s. per ton; mixed iron, first quality, 8*l.* 16s. to 9*l.* per ton; ditto, second quality, 8*l.* 12s. per ton; iron from charcoal-made pig, first quality, 9*l.* 8s. to 9*l.* 12s. per ton; ditto, second quality, 9*l.* to 9*l.* 4s. per ton. Sheets have also been in good demand, and have made 9*l.* 8s. to 9*l.* 12s. per ton, first category coke-made; and 10*l.* 8s. to 10*l.* 12s. per ton puddled charcoal-made. Machine iron has hardened in price more and more, and new orders have only been accepted at an advance; No. 20, charcoal-made, is quoted at 10*l.* 8s. per ton; mixed ditto 9*l.* 8s. to 9*l.* 12s. per ton; coke-made ditto, 9*l.* 8s. per ton. The proprietors of foundries in the Champagne district are now very well satisfied; the contracts which they have to execute assure them a good season. No new affairs are mentioned in refining pig; producers have many engagements to fulfil, while English refining pig, in consequence of the low price at which it is offered, competes with that made in the Champagne group. The markets of the Meurthe and the Moselle do not show any symptoms of weakness; pig is in great favour, and 2*l.* 17s. 6d. per ton is paid for refining in connection with long-termed contracts; speckled is worth 3s. to 4s. per ton more, and grey pig for second fusion purposes, does not make less than 4*l.* 1s. 8d. to 4*l.* 4s. per ton. In merchants' iron there have been numerous transactions at 8*l.* 8s. per ton. Mention is made of two new railways intended to accommodate the proprietors of the mineral concessions of the Longwy district and its environs; it is also proposed to unite the Hayange group to the canalised Moselle. The Besançon Chamber of Commerce reports that the industry of the French-Comté district did not experience any very notable change last year; the group, which comprises 24 establishments, and which occupies 2900 workpeople, has had numerous orders to execute for coke-made iron. Prices for this description of iron and other products have been affected, however, in some cases by the competition of Swedish iron. Among recent orders given out for railway *matériel* in France we may note one for 4000 tons of iron rails entrusted by the Orleans Railway Company to the Vezin-Aulnoye Company at 8*l.* 5s. per ton, delivered at the Ivry station. The Northern of France Railway Company has given a small order for 100 tons of rails to MM. de Wendel at 8*l.* 4s. per ton, delivered at the Laon station. Thirty turntables, of 16 ft. 8 in. and 18 ft. diameters, have been ordered by the Southern of France Railway Company from M. Baudon, of Lille, at 9*l.* 16s. per ton, delivered at Bordeaux. The Northern of France Railway Company has ordered an iron bridge of 83 ft. span from M. Merveille-Kling; the contract price is 17*l.* 19s. 6d. per ton, delivered at Lille. The same company has ordered two cranes, capable of loading 10 tons each, from MM. Bolgues, Rambourg, and Co., at 14*l.* 8s. per ton, delivered at Batignolles. The Southern of France Railway Company has ordered 80 tons of cast-iron pipes from the Marquise Company at 7*l.* 6s. 8d. per ton, delivered at Bordeaux.

The Haute-Dordogne Mines Company has just held its meeting for the past year. The balance to the credit of the profit and loss account was returned at 2589*l.* The council of administration proposed to the shareholders to introduce modifications into the statutes, and to increase the capital of the company to 120,000*l.* The company has been authorised to acquire some new concessions, and also to occupy itself with the working of forests. The Bonne Esperance and Batterie Collieries Company will pay, on July 1, its second dividend for 1869, or 4s. per share. The Thy-le-Château Blast Furnaces and Forges Company will pay, on July 1, its dividend for 1869, which is at the rate of 15 per cent. per annum. The Pontgibaud Mines Company has been paying during the last few days a dividend of 12s. per share, on account of profits realised, or to be realised, during the exercise terminating June 30, 1870.

FOREIGN MINES.

ST. JOHN DEL REY.—Morro Velho, May 17: Morro Velho produce for April, 7143 oits.; from 3620 tons of ore. yield 1·973 oits. per ton; cost, 4052*l.*; loss, 1240*l.* Morro Velho produce, ten days of May, 3065 oits.; yield, 2·346 oits. per ton. The above is better produce than we have extracted for some months past, and, as there is reason to conclude the same yield may now be obtained from the mineral accessible, we may hope during May to show a better account than the previous month exhibited.

DON PEDRO.—Mr. F. S. Symons reports for April—Produce, 8938 oitavas, at 8s. 6d. per oit., 3798*l.* 13s.; cost, 3616*l.* 8s. 10d.; profit, 182*l.* 4s. 2d. The large amount of 1146*l.* has been paid for timber, &c., and has been charged in cost. The produce exceeds that for March, though it is not what I could wish. Little or no box work has been taken out, and this under difficulties, through water from the bottom of the mine. No. 6 continues poor and disordered, and we have struck as yet nothing rich in the auriferous lodes discovered at Alice's west; they are, however, most promising. Seeing that our shallow workings and reserves are not turning out rich work, that water is increasing so much in Vivian's shaft as to already overpower animals, it has become a matter of necessity to employ special measures to prosecute sinking, so that the rich stoping ground in the main shoot can be worked, and thus give us good returns until permanent pumping machinery is erected. To attain this we are building with all dispatch a water-wheel, to drive the horse-engine in lieu of animals, and give extra power to the machine. With the wheel at work we are sanguine that matters will go on more satisfactorily than for the last four months, and hope to get to work in July. We are opening a large level on the course of the auriferous lode at Alice's west, which continues most promising in appearance, and has all the characteristics of having in connection with it rich deposits. Reserve underlie lode is bunchy and not regular in yield, but, on the whole, turns out fair work for the strakes. Canoa in underlie lode was never richer than at present, and had we not been troubled with water the produce from this part of the mine alone would amply compensate for disappointment in others. Vivian's shaft being sunk the requisite distance, so as to drive under and drain, we shall again be enabled to work this section to advantage, as well as the curve so long in abeyance.—Extract from letter dated May 17: Produce weighed to date, 1475 oits. I have nothing new to advise, and am sorry still to report no rich work having been taken from No. 6, or Alice's west. The line in the former continues disordered. Very little ore has been taken from canoa, in underlie lode. In next division there will be more, as we have fixed a pump with good effect. Water has increased so much in Vivian's shaft that sinking is almost, I may say, in abeyance, and will be until the wheel is at work. Captains and men are, I am proud to say, working heartily; all feel that the Don Pedro has heavy work before it for some time, but all are confident that we shall regain our previous proud position when the mine is efficiently drained.

ANGLO-BRAZILIAN.—Mr. F. S. Symons reports for April—Produce 3134 oits. at 9s., 1410*l.*; cost, 1555*l.*: loss, 145*l.* The different operations have been carried on with regularity. The Easter holidays affected the attendance of force, and consequently the supply of stone. Hesketh's stamps have been idle the greater part of the month, owing to breakage of millier. These drawbacks, together with April being a 30-day month, have naturally affected the produce; it is pleasing, however, to note that the standard shows a trifling improvement.

TAQUARIL.—T. S. Treloar, May 15: By last mail I had the pleasure of advising the successful working of our pumping machinery. On this occasion I have the satisfaction of communicating the equally pleasing information that Martin's cross-cut intersected the lode on the 2d inst. 20 fms. eastward of old shaft, and that some of the samples taken showed gold. This circumstance, I need scarcely add, is not a little promising for the future. The sump-shaft is now 42 fms. from the surface, and water easily kept in fork by the engine making two strokes per minute only. Level to old working will be commenced in the course of another two or three days, and should the ground prove favourable for driving the bottom of the old mine will, we expect, be reached in about six weeks.

ROSSA GRANDE.—Mr. Ernest Hilcke reports for April—The gold return for the month amounts to 1851 oits., derived from 109 tons of ore; yield, 17 oits. per ton; total cost for the month, 1174*l.* In Mina de Serra the appearance of the lode at most of the places of progress has not undergone any particular change. The contraction of the lode has caused a decrease in the quantity of ore extracted: its auriferous quality, however, continues to be highly pleasing. In Cachoeria Mine the cleaning out has been pushed on with every means at our command, and we are in good hopes to intersect the lode here during next month. In Gongo Mine we are driving a level west of Angove's shaft on a small vein, which by sampling will show now and again a few particles of gold; the jacotinga surrounding this vein, however, is not of auriferous nature, but we shall meet with a more promising jacotinga further west if the vein should extend to this point, which it very likely will; there is every probability that it will turn out something of consequence.

GENERAL BRAZILIAN.—Capt. Thos. Treloar reports for April—At Itabira explorations have been commenced, and promising samples of gold have already been obtained; indeed, had the water-courses and stamping-mills been in working order gold returns could be obtained. The water-courses and stamping-mills, however, are in a very dilapidated condition, and if we withdraw force from the other points in progress to repair them, it would be disadvantageous to the true interest of the company.

ANGLO-ARGENTINE.—J. Vivian, Gualilan, April 9: Samples of ore from the main lode cut in the cross-cut driven in the base of the hill I have forwarded in a parcel to the London and River Plate Bank, Buenos Ayres, for transmission to you by the first steamer. In my report on the lode, which I send herewith, I have stated (say) 1 oz. of gold to the ton of ore, which please alter according to the assays of the sample. We have commenced to drive north and south of the cross-cut in the lode, which is looking remarkably well. There is not a shadow of doubt on my mind but that Gualilan will be a great success. Everything here is going on well.—Report: In the cross-cut in the base of the hill we have driven through the main lode, which is 26 ft. in width; it is composed principally of iron pyrites, quartz, with a mixture of mineral clay and sulphate of zinc, the whole of which is auriferous; it is the finest-looking lode that I have ever seen, and it will give 8*l.* tons of ore to the fathom—that is to say, 6 ft. long, 6 ft. high; and the width of the lode (say), 1 oz. of gold to the ton of ore, the lode will be worth 240*l.* per fathom, supposing the gold not to be worth more than 3*l.* per ounce; the lode can be broken, and made ready for stamps for 16*l.* per fathom.—N.B. The samples have not yet come to hand; as soon as they arrive they will be sent to the assayers, and the results communicated to the shareholders.

NEW ROSARIO (Silver).—Capt. Grose reports—We have a promising lode in the present end of the San Pedro adit, and are within about 25 or 30 yards of the rich vein of San Francisco, where, upon a little shaft sunk down about 25 yards, we have taken out ores which have assayed from 30*l.* up to 400*l.* per ton; and our adit will come in under this shaft about 120 yards, thus laying open an immense range of productive lode. And this adit is not on the main part of the Carretera lode—that is still further west about 40 yards, where the vein is from 15 to 20 feet wide. The mines at Real del Monte are looking better than ever, producing 4500 cargas of ore per week from the same lodes our mines are on, which would amount to 234,000 cargas, or 23,400 montons, per annum, which, at only 12 marcs per monton, would be worth 449,280*l.* The deeper they go the better they become.

PACIFIC.—The directors have advices from Capt. Brown, their agent at Lander Hill Mine, dated May 21. "Since my report on Thursday the 400 ft. level west still continues worth 200*l.* per fathom. I think we shall have a good shoot of ore in this direction; the lode at this point is standing in whole to surface, which will give us from 700 to 800 ft. of backs above this level. As soon as I possibly can I shall commence a rise to open out stopes, and at the same time I will push on the rise to make an intermediate level. From what I can learn the Stettefeldt furnace will not be in operation for six weeks, and we shall not be able to stamp any quartz for that time; I hope by then to have out a good pile of ore. I have put up a small house on the mine, so I am there all the time. I am doing everything that I possibly can so as to get our mines on the Dividend List."

SAO VICENTE.—Report for April: Jacotinga Formation: The following cross-cuts have been extended during the month:—No. 2, 5 fathoms 5½ feet; No. 4, 1 fathom 2 feet; No. 5, 6 fathoms 3 feet. In the last-mentioned level we have sunk 9 feet close to the present end, chiefly in sand, with small lines of jacotinga and iron. The character of the ends is not much changed in appearance. All operations are going on steadily.—First division of May:—Mine: Our operations in the jacotinga formation at Capanemma are at present confined to exploring Nos. 2 and 5 cross-cuts. There is no material alteration in either of the levels to call for remark; the lines are small, and have not yet shown any gold. I hope soon to have something more cheering to report.

EXCHEQUER.—Capt. Chalmers, May 16: During the week ending Saturday, the 13th, the air shaft was raised 8 ft. by one shift, the other being at work on the road, and grading from the road to the tunnel. The east cross-cut from the 50, in the winze, was driven 9 ft., partly through porphyry; I think if this cross-cut were continued 40 or 50 feet it would cut the Accacia lode, and prove it there; but as we are anxious to get on with the stoping I commenced drifting north on the footwall, and run 3 ft., passing on our right small streaks of ruby ore, which look well, and will be assayed to-morrow.

BRAGANZA (Gold).—According to the report of Mr. W. H. Richards, May 15, they can at this moment supply 30 tons of ore daily. On the completion of the levels now driving, and of the tramroads contemplated, they can increase the quantity to 50 tons daily. The total cost of breaking, carting, and reducing the ore is estimated at 7s. 6d. per ton. Specimens from the veins have yielded 3, 4, and as high as 8 ozs. per ton. All work is going on as fast as their force will allow them. Mr. Richards considers their position highly satisfactory, both as to the work performed and the present appearance of the mine in the various localities they are exploring. They are making very satisfactory progress with the erection of the stamps. He is in hopes, notwithstanding the absence of the carpenters, who are suffering from influenza, which is very prevalent here just now, they will go to work by the end of the month.

PESTARENA UNITED.—Thomas Roberts, June 9: Peschiera: The lode mentioned in our last reached in the cross-cut west at the 33 is 2½ ft. wide. This week we shall make trials of the ore from this new point with some of the small mills. We have not the least doubt, judging from its appearance and the locality it came from, of its being rich ore. This lode is known as the western part of No. 2 lode, and is 20 metres west of No. 1 lode. The cross-cut cut into it opposite the openings made on the great course of ore that has so regularly gone down from surface. The stopes in bottom of the 70 yield 8 tons of ore per fathom, worth 1¼ oz. of gold per ton. All other stopes and ends not mentioned are much the same as last reported.—Val Toppa: In the cross-cut west, at No. 3, we have not as yet cut through the whole width of the lode. The stopes in back of No. 3, on the side lode, yield 10 tons of ore per fathom, worth 1½ oz. of gold per ton. The end south at No. 2 yields 7 tons per fathom, worth 7 dwts. per ton. No change in the stopes in back of No. 2 level.

— On the 30th we consigned to C. Menozzi for remittance to the company's offices in London seven ingots of gold, 621 ozs. 8 dwts. 9 qrs., and to-day we consigned for remittance six other ingots and one button, 55 ozs. 19 dwts. 15 grs., amounting together to 677 ozs. 8 dwts., being the produce from 864 tons of ore amalgamated from Pestarena and Val Toppa mines in the month of May: 520 tons of ore amalgamated from Val Toppa gave 395 ozs. 6 dwts. 20 grs.; 162 tons amalgamated at Pestarena 171 ozs. 19 dwts. 2 grs.; and 182 tons from Pestarena, amalgamated at Battigio establishment, 110 oz. 2 dwts. 2 grs.—Mines: The lode in the 10 end, south of Aquavite boundary winze, yields 4 tons of ore per fathom, worth ½ oz. of gold per ton. The winze sinking under the 10 is yielding 6 tons of low-class ore per fathom. The stopes in bottom of adit, on Aquavite lode, yield 6 tons, worth 9 dwts. per ton. The end south of cross-cut, on No. 2 lode, yields now 5 tons per fathom, worth 14 dwts. per ton, and bids fair for a further improvement. The end driving north at the 23 yields 8 tons per fathom, worth 14 dwts. per ton. The stopes in back of this level yield 6 tons, worth 8 dwts. per ton; stopes in bottom 7 tons, worth 1 oz. per ton. The stopes in bottom, south of whim-shaft, 5 tons per fathom, at 1½ oz. per ton; the 23 end south 3 tons, at 10 dwts. per ton. Stopes in bottom, south of winze, 15 tons per fathom, worth 1 oz. of gold per ton. The 33 end south is poor at present. The winze behind this end yields 5 tons, worth 1 oz. per ton. The end driving south at the 46, to communicate to the last-mentioned winze, has improved a little in the past week. We expect to reach the course of ore gone down in the bottom of the 33 shortly. The stopes in bottom of the 46 south yield 5 tons per fathom, worth 1 oz. per ton.

Peschiera: The stopes in the bottom of the 75 yield 5 tons per fathom, worth 1¼ oz. per ton; and the stopes in the bottom of the 70, 8 tons, worth 1¼ oz. per ton. The stopes in the bottom of the 46, 5 tons, at 12 dwts. per ton. The stopes in the bottom of the 33, on No. 2 lode, 3 tons, at 15 dwts. per ton. The cross-cut west in this level has reached the western part of the lode; we have not as yet made any trial of the ore. The stopes in the bottom of this level, on No. 5 lode, yield 5 tons per fathom, worth 15 dwts. per ton. The stopes in the back of the 16 yield 4 tons of ore per fathom, at ½ oz. of gold per ton; and the stopes in the bottom, 8 tons per fathom, of similar ore. Fair progress has been made in clearing and laying the tramroad in the 46 north; this road is now completed to the junction of the slide to No. 1 lode. The ore hoisted by tackies through winzes from the bottom levels to the 46, is now taken through this level to the whim-shaft, while before the communication of the shaft to the 46, we were obliged to take it with tackles up to the 33. We are now engaged in putting a stope over the bottom of the level, on No. 2 lode, so as to bring the tramroad on to the workings on No. 2 lode.—Val Toppa Mine: The lode in the end driving south in No. 1 level produces 7 tons per fathom, worth 8 dwts. per ton. We have suspended the end driving north for the present, and commenced to sink a winze to communicate to the stopes in the back of No. 2 level. In the cross-cut east from the north end, in No. 2 level, we have reached the footwall of the lode, which is about 4 feet wide, and from the trials made proved the ore from this new point to be worth 1 oz. of gold per ton. We have started to drive north on this lode with a full pare of men, and shall also commence to drive south of cross-cut on this lode in a few days. All the stopes in the back of No. 2 level are the same as last reported. No. 3 level, in the second cross-cut west, which we mentioned in a former report that we had reached a branch, we are pleased to say now that we have reached a lode in this cross-cut; so far as seen it looks well; a trial of the ore will be made in a few days. The rise on the side lode yields 8 tons per fathom, worth 1¼ oz. of gold per ton. The stope south of this rise is yielding exceedingly well.—F. ROBERTS, J. MITCHELL, T. WARNE.

CAPE (Copper).—The directors have despatches, per Celt. The superintendent was on his way from Cape Town to Namaqualand, and the letters, as usual, by the intermediate mail, contain no mining news. The Colonial Chief Inspector of Public Works had visited Port Nolloth, and had approved of plan of jetty; he had also travelled over the completed portion of the line, expressing his satisfaction with the execution of the work. The Antonio Vinent has arrived at Swansea with 615 tons; 98 tons were sold by public ticket on the 7th inst., at an average of 13s. ½d. per unit.

[For remainder of Foreign Mines see to-day's Journal.]

AUSTRALIAN MINES.

YUDANAMUTANA (Copper).—The superintendent (Adelaide, April 25) states—"I have just returned from the mine, after a three weeks absence. During my stay I superintended the altering of No. 1 furnace into a roaster for immediate use, and No. 5 into a roaster for service in the event of anything happening to No. 1. Nos. 2 and 4 furnaces were working as smelters while I was there, and No. 3 was under repairs. The operations of March month and early part of April have been very unprofitable, but we hope to make up for it by the end of the month. In the week ending April 16 things were going somewhat right again, and we made 12 tons of metal with the two furnaces. We have a mine second to none here, but have not the means to work it to the best advantage. I must add that it will be necessary at once to commence sinking a downright shaft, 150 fms. over the sulphuret lode, which will really be on 25 fms. of sinking, as we have already stoped away an immense cavern, from the 25 to the 50. The sinking will cost about 20*l.* per fathom., and must be done at once, for if we come to water, without a shaft ready to fork it, we are at once stopped in this part of the mine. I have sent you a box of samples representing the whole of the workings, from the top of the hill down to the 50, and should much like to have an opinion of value that may be tendered to the board by shareholders or others respecting the samples." Capt. Terrell reports, under date April 16—"Blinman Mine, No. 1 Winze: I am pleased to say the lode in the bottom is looking just as rich as when I wrote last—about 2 to 2½ feet wide, good yellow ore, coated black.—No. 2 Winze: There has been nothing done here since my last.—No. 3 Winze: The lode is still about 10 to 12 feet wide, of good smelting work, averaging about 8 to 10 per cent. all through. The winze between the Nos. 2 and 3 shafts, in the 25, is looking better than when I wrote last. The stopes south of No. 1 winze are also looking better; the course of ore is widening as it goes down. These are all the places which are at work at present. We have been favoured with some good rains, and at present it threatens for more. The superintendent has appointed Mr. Thomas to take charge of the works. I believe him to be a competent man, and think that the company will save by having him." Copper ore raised from April 1 to 16, 154 tons; copper ore smelted, 154 tons; copper made, 14 tons 14 cwts. 1 qr.

YORKE PENINSULA.—The directors have advices from the Committee of Inspection at Adelaide, dated April 22, with reports from the Kurilla Mine to the same date. The following are extracts from Capt. Anthony's reports:—Hall's engine-shaft has been sunk rather more than 1 fm. since last monthly report, and the ground is becoming easier for sinking. The lode continues to yield good stones of yellow ore, but not yet sufficient to pay for working. It now appears that the principal part of the lode is standing to the north of the shaft, and from the quantity of water flowing from it, I hope to find it, when driving is commenced, a larger and better lode than has yet been seen in the upper level. The total depth of the shaft is about 44 fms. 5 ft., so that after sinking (say) a fathom more I shall begin to drive the 45 fm. level. . . . . Deeble's shaft is sunk to the 25 fm. level, and securely timbered. It is divided, and a ladder-road is fixed as far as the 15 fm. level, with whim, pulley, stands, and shears complete for future working. Six men are driving the 25 fm. level to the west of Deeble's, at 10*l.* per fathom. This end is now in a floor of mundic of 3 ft. wide, which has almost completely displaced the ore. As, however, this is the next best thing to copper ore, and is always, more or less, associated with it, this is no matter for alarm, and especially as the same floor was passed through in the rise, and where a good lode of black ore overlies it, which we must soon meet with in the level, it having a westerly dip. . . . . Four men are stoping ore in the east end of this shaft, about 11 fms. from the surface, and the lode will yield about 6 tons of average ore per fathom. I have about 35 tons of ore on the mine, and next week I shall put six men to stope ore in the back of the 15 fm. level, west of Deeble's shaft, so as to send a parcel to market by the first week in next month.

PORT PHILLIP AND COLONIAL (Gold).—Mr. Bland, Clunes, April 22: The quantity of quartz crushed during the four weeks ending March 30 was 4141 tons; pyrites treated, 36 tons; total gold obtained, 825 oz. 5 dwts., or an average per ton of 3 dwts. 23 grs. The receipts were 3144*l.*; payments (including 604*l.* paid on account of firewood and of timber), 3720*l.*: loss, 576*l.* which, added to the debit balance brought forward from last month of 3773*l.*, makes a total to the debit of the joint account of 4349*l.* The return for the two weeks ending April 13 is as follows:—Quantity of quartz crushed, 2082 tons; pyrites treated, 13 tons; total gold obtained, 317 ozs. 13 dwts., or an average per ton of 3 dwts. 1 gr. In the mining report it is advised that no further exploration on the Old Man vein, in the 590 ft. level, can be made until 100 ft. of cross-cut is driven, and this is estimated to take about eight weeks when commenced.

SCOTTISH AUSTRALIAN.—The directors have advices from Sydney, dated April 20, with reports from Lambton Colliery to the 17th. The Company's sales of coal for the month of March amounted to 8583 tons. Mr. Morehead reports that a general slackness in the coal trade of the colony had prevailed during the month.

ENGLISH AND AUSTRALIAN (Copper).—The directors have advices from their sub-manager, dated Port Adelaide, April 25. The returns of furnaces at work and stocks on hand have not come forward by this mail. Since date of last advices 100 tons of copper had been shipped, and a further 100 tons was in course of shipment. Mr. Hamilton, the manager, was at Newcastle, superintending the completion of the new smelting works. The extension of the wharf at Port Adelaide was rapidly approaching completion.

WORTHING.—Adelaide, April 23: We are busily engaged driving the cross-cut in the 103 fm. level, with six men; the remaining three shaftmen are engaged dividing the shaft, putting in ladder-road, and cutting a small plat for the stuff to lodge in. The cross-cut is now in 5 fms. 3 ft.; ground good, present price for driving 7*l.* per fathom. The 93 cross-cut east, to Boundy's, I believe, is up close to the lode, and we have met with some stones of rich looking ore, but enough has not been done to prove its value; I hope my next report will give a good and full account of the lode. The 93 north has been good for the last 8 fms. driving, yielding about 4 tons to the fathom; price for driving, 5*l.* 5s. per fathom. We are obliged to stop this end for the present, on account of the air being very bad. We put the men to rise in the back of the 93, and also a pare to sink a winze in the bottom of the 83, so that I hope by the end of the present month to hole through and get plenty of air for working, and also a good stope of ore to take away. We shall then commence afresh to drive the 93 end north, where we hope to make further improvement. The stopes are about as usual as to quantity and quality. Ore raised and dressed during the month, 210 tons. Copper shipped, 23 tons. Copper on hand, 19¾ tons. Number of hands employed, 128.

AUSTRALIAN UNITED (Gold).—The directors have advices from Mr. Kitto, dated April 23. Mr. Kitto writes:—"Central Mine: At this place we are getting on as favourably as can be expected, and trust to be able to commence washing in five weeks at the latest." The report of the agent (Captain Holman) to Mr. Kitto, of the 23d, is as follows:—"Since my last monthly report the works here have gone on satisfactorily. The shaft is now down a little over 250 ft.; the plat has been commenced, and we are now in 17 ft. from the shaft. The ground is nice clean slate, or killas ground, easy to drive, and, I believe, would stand without timber; in fact, we can at any time reach the wash-dirt, or drift, with a week's notice. There are two sets of horses now erected for fixing pudding-machines, and the remainder are cut out ready for fixing. The winding-engine is a great saving to the company, and works well. The dam has been commenced for storage of water for washing purposes, and all the works are progressing satisfactorily. I can say nothing further of our prospects, except that my opinion remains unaltered." From the Duke of Cornwall Mine the agent (Captain Williams) reports (April 23):—"Daukes's Engine-Shaft: Since my last report we have opened out ground, and made the necessary preparations for sinking. We have also let the shaft to nine men, at 5*l.* 5s. per foot. In consequence of the breaking of the stamp-axle, we are obliged to suspend all other underground operations for awhile. I beg to state that we still continue our surface operations in extracting the pyrites from the sand or tailings that were in reserve previous to our commencing that process."

ANGLO-AUSTRALIAN (Gold).—Mr. Kitto, the manager in Australia, sends the following report from Capt. Ralsbeck, dated April 23, showing the progress made since March 29:—"No. 3 Shaft: I am still sinking this shaft with two men; present depth, 57 ft., and I expect to strike a leader in a few feet more, which has been worked 80 ft. to the west, and paid well some years since.—No. 4 Shaft: I am also sinking this, the eastern shaft, with two men; present depth, 61 ft. 6 in. I expect to cut the reef at about 70 ft. No. 5 or south shaft is 60 ft. At 46 feet a leader was cut 1 ft. thick; and at 53 ft. another leader was cut 3 ft. thick. I put in a drive west on the same level 16 ft.; the quartz in the present end is 3 ft. thick. Fine gold can be washed with the dish. I have erected a whip on No. 1 shaft, and altered the collar of the shaft, for the convenience of pulling water. I commenced bailing last evening, and expect to have the water out to-night. The late rains have thrown 4 ft. of water into the drain, and I am glad to say the bank does not leak."

WINTER'S FREEHOLD COMPANY.—At a meeting of shareholders, held at Ballarat, on April 11, the debts and interest were stated at 31,000*l.*, less 6000*l.* due on calls. Two calls of 10s. per share each, have been made on both English and Australian shareholders during the quarter. The shares subscribed in England are 603 in number, and under date Jan. 28 Mr. Dicker expressed hopes of selling the balance of the 1000. An extraordinary general meeting has empowered the directors to give further security over freehold and other property, to secure payment of debt and interest due to the Bank of Victoria.——A correspondent adds—"I do not exactly understand the precise position of this company's affairs, but it would appear to be most unsatisfactory—indeed, as one letter states, to be almost approaching bankruptcy."

SOUTH AUSTRALIAN STEEL-SAND.—It has long been known that titanic iron, in the form of sand, exists in abundance on the Port Lincoln coast, and at different times samples have been sent to England and Melbourne to be tested. This iron might more properly be called steel, as with one process it turns out a very useful steel. We understand the great difficulty hitherto has been to get a proper and cheap flux to reduce it with, but a gentleman in Adelaide, who takes some interest in these matters, has, he believes, discovered a material that can be procured in any quantity, and is admirably adapted for the purpose. Some experiments made at Wyatt's foundry with the steel and the new flux have turned out successful. Mining claims have been taken out where his iron-sand is found, and the discovery, it is hoped, will be fairly developed.

COAL IN TASMANIA.—Another coal field has been discovered in Tasmania by Mr. Andrews, contractor, on the line of the Mersey and Deloraine Tramway, as it passes from Railston towards Caroline Creek. It appears that the workmen in carrying out the works had exposed a seam of what is described as "a magnificent coal." Its heating properties are said to be superior to the coal found at the Don, and also to that worked at Ballahoo, on the Mersey; and the smelters engaged in smelting operations at Wallaroo, South Australia, report these coals as the most powerful for smelting purposes of any hitherto found.—*Mining Record* (Victoria).

MANUFACTURE OF COPPER.—The invention of Mr. J. B. ELKINGTON, of Birmingham, consists in improvements in the method of conducting this process. The inventor prefers to employ copper ores which contain sufficient silver materially to injure the copper if smelted in the ordinary way, and which, consequently, would usually be submitted to a process for extracting the silver before they are smelted. He smelts the ore in the usual way, so as to obtain all its metallic contents (except such as may be volatile) in the form of regulus, from which state (by preference, but it is not essential), he carries the metal on to the state of pimple or blister copper. This impure metal the inventor cast into plates (say, 24 in. long, 8 in. wide, and 1 in. thick). One end of the plate is provided at the centre with a stout T-shaped head of wrought copper. It is placed in the mould in which the plate is cast; cast-iron moulds are used; the metal is tapped out of the furnace on a sand floor, and is led by channels into the moulds.

TREATING PYRITES.—The invention of Messrs. HARGREAVES and T. ROBINSON, Widnes, Lancashire, consists in passing a current or currents of heated atmospheric air and water vapour together through a layer or layers of broken, crushed, or powdered pyrites, so as to convert the sulphides of iron and copper, or either of them, into sulphates. The soluble sulphates, or either of them, are separated by lixiviation, and then treated by any known means to render the sulphates, or either of them, available. When burnt pyrites is the material to be operated upon, the inventors convert the remaining sulphides of copper or iron, or either of them, into soluble sulphates in the manner herein set forth, and after separating the sulphate or sulphates, or either of them, the residue of oxide of iron is available in the manufacture of iron, and for other purposes.

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